

**READER FOR DECODING TWO-DIMENSIONAL
OPTICALLY READABLE INFORMATION**

CROSS REFERENCE TO RELATED APPLICATIONS

The present application is a division of U.S. Application No. 10/701,199 filed November 4, 2003 which is a continuation of U.S. Application 09/961,697 filed September 24, 2001, now U.S. Patent No. 6,641,046, which is a continuation of U.S. Application no. 09/170,689 filed October 13, 1998, now U.S. Patent No. 6,330,975 issued December 18, 2001, which is a continuation of Application No. 08/703,564 filed August 27, 1996, now U.S. Patent No. 5,821,523 issued October 13, 1998, which is a continuation-in-part of Application No. 08/461,605 filed June 5, 1995, now U.S. Patent No. 5,902,988 issued May 11, 1999, which is a continuation of U.S. Application No. 08/277,132 filed July 19, 1994, now abandoned, which is itself a continuation of U.S. Application No. 07/919,488 filed July 27, 1992, now abandoned, which is a continuation-in-part of two applications: (1) U.S. Application No. 07/849,771 filed March 12, 1992, now abandoned; and (2) U.S. Application No. 07/889,705 filed May 26, 1992, now abandoned. The U.S. Application No. 07/889,705 is a continuation-in-part of Application No. 07/849,771. Application No. 08/284,883 filed July 28, 1994, now U.S. Patent 5,414,251 issued May 9, 1995, is a continuation of the Application No. 07/849,771.

INCORPORATION BY REFERENCE

The patent applications relied upon in the section entitled "Cross References to Related Applications" which were filed on or before June 5, 1995, and U.S. Patent Nos. 5,821,523 and 5,902,988, are hereby incorporated herein by reference in their entirety, including original claims and incorporated material.

BACKGROUND OF THE INVENTION

1. Technical Field

The present invention is directed to optical information readers and particularly to readers adapted to selectively decode two-dimensional optical information sets.

2. Description of the Prior Art

Conventional bar code symbols have small data storage capabilities. This reduces the utility of conventional bar code scanner and reader systems. For example, the 11 digit Uniform Pricing Code found on most supermarket items acts as an identifying number which may be utilized to access information in a database. Codes of this type do not carry information along their vertical axis, and are therefore, less prone to skewing errors during decoding.

Two-dimensional bar code symbols or "portable data files" have recently been developed. With codes of this type access to a database is not required since the code contains the information which would normally be keyed for in a database. Since reliance on a database is not required, information may be accessed and exchanged more readily and reliably. However, in order to decode two-dimensional codes, a more sophisticated apparatus is required. This is primarily true since normal vertical code redundancy is not present, making code registration, orientation and condition very important.

Several two-dimensional coding standards have been proposed, e.g., Code 49, 16K, Identicode MLC-2D, and Code PDF417. While such codes are capable of storing information such as price, name of product, manufacturer, weight, expiration date, inventory data, shipping information, and the like; apparatus which assist the user in aiming and decoding two-dimensional codes are not currently available. For example, two-dimensional codes might consist of a stack of conventional linear codes. Each line may contain different information, such as (1) pricing information, (2) product name, (3) name of the manufacturer, (4) product weight, (5) expiration date, (6) inventory data, (7) shipping information, and the like. Additionally, a user may require the ability to selectively store or send portions of the decoded bar code symbol.

3. Objects of the Invention

Therefore, a principal object of the present invention is to provide a reader adapted to selectively read two-dimensional optical information sets.

Another object of the present invention is to provide a reader adapted to selectively read two-dimensional optical information sets in ambient light.

Another object of the present invention is to provide a reader adapted to selectively read two-dimensional optical information sets from a wide range of distances.

Another object of the present invention is to provide a reader adapted to selectively read optical information while assisting a user in aiming the reader.

Another object of the present invention is to provide a reader adapted to selectively read two-dimensional optical information sets which is economical to manufacture and durable in use.

Another object of the present invention is to provide a reader adapted to selectively read two-dimensional optical information sets which is efficient in operation, simple in construction, easy to use and trouble free. These and other objects will be apparent to those skilled in the art from the following disclosure.

SUMMARY OF THE INVENTION

The present invention discloses a novel reader for reading optical information. In one exemplary embodiment the invention includes a housing for supporting a photosensitive array associated with an optical string means which is adapted to focus optical information on the array. Also provided are array and optical string control means for controlling the array and optical string such that the output of selected images on the array may be processed via pattern recognition means. Images on the array may be presented to the user by a display means. Images recognized to contain decodable optical information may be displayed and highlighted on the display means. In this fashion a user is assisted in aiming, recognizing and confirming the decodability of a coded image incident on the array.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects and advantages of the invention will be apparent upon reading the following detailed description and upon reference to the drawings; in which:

FIG. 1 is a perspective view of a preferred embodiment of the two-dimensional optical information reader showing a user being assisted by the display of the reader in aiming;

FIG. 2 is a partial top perspective view of the reader illustrating the display wherein the display indicates to a user that a two-dimensional, decodable, bar code symbol may be read if the user adjusts the aim of the reader to the left and above;

FIG. 3 is a partial top perspective view of the reader illustrating the display wherein the display indicates to a user that a two-dimensional, decodable bar code symbol is centered in view and available for reading;

FIG. 4 is a highly diagrammatic perspective view of the image capturing elements of a linear array exemplary embodiment of the present invention;

FIG. 5 is a highly diagrammatic perspective view of the image capturing elements of a two-dimensional array exemplary embodiment of the present invention;

FIG. 6 is a block diagram illustrating the various components of the present invention; and

FIG. 7 is a more detailed diagram illustrating the various components of the present invention.

While the invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined by the appended claims.

The detailed description of FIGS. 1-7 as found in U.S. Patent 5,902,988 from col. 2, line 63, to col. 7, line 67, is hereby incorporated herein by reference in its entirety.

The detailed description and drawings of U.S. Patent 5,821,523 are also incorporated herein by reference in their entirety as showing in further embodiments within the scope of the present invention.

INCORPORATION BY REFERENCE

The present invention may be construed for use in a docking type system for recharging/communicating with the apparatus disclosed herein. A docking station which might be adapted for use with the present invention is disclosed in U.S. Application Ser. No. 07/451,322, filed Dec. 15, 1989, (now U.S. Patent No. 5,227,614), which application is incorporated herein by reference in its entirety as illustrating arrangements which may be embodied in a peripheral shell 260 (FIG. 10; Ser. No. 07/451,322). Likewise, the disclosure of U.S. Patent No. 4,877,949, issued Oct. 31, 1989, is also incorporated herein by reference, in its entirety, as illustrating means for focusing an image of optically readable information over a substantial range of distances. Also incorporated herein by reference is U.S. Application Ser. No. 07/451,322, filed Dec. 15, 1989, (now U.S. Patent No. 5,227,614) as illustrating a display 14 (FIGS. 13 and 14) adapted to assist a user of an apparatus in reading optically readable information. Finally, also incorporated in its entirety herein by reference is U.S. Application Ser. No. 07/143,921, filed Jan. 14, 1988, as illustrating optically readable information digitizing and decoding means (FIGS. 7 through 18).

While the invention has been described with a certain degree of particularity, it is manifest that many changes may be made in the details of construction and the arrangement of components without departing from the spirit and scope of the disclosure. It is understood that the invention is not limited to the embodiments set forth herein for purposes of exemplification, but is to be limited only by the scope of the appended claims including the full range of equivalency to which each element thereof is entitled.

Thus, there has been shown and described an improved optical information reader which accomplishes at least all of the stated objects.